

DEPARTMENT OF COMMERCE

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BUREAU OF STANDARDS

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ADDRESS REPLY TO
BUREAU OF STANDARDS

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RECLAIMING CRUDE RUBBER

A tire carcass bursts, soles of overshoes become thin, a hole develops in a hot water bottle. The surface of the rubber may have hardened by oxidation. Nevertheless much good rubber remains which can be recovered and incorporated with new rubber to be used once more. It is even necessary that this be done to insure a sufficient amount of raw material for the rubber industry.

Reclaimed rubber is a plastic product prepared by subjecting vulcanized rubber scrap to processes of grinding, chemical treatment, and refining. It is estimated that the annual output in the United States amounts to 100,000 tons.

The first commercial reclaimed rubber product was known as "rubber shoddy". Old boots and shoes were ground to powder, the loosened fiber blown out, and the residue treated with live steam for 8 or 10 hours. Later, in a modification of the process the fiber was disintegrated by treatment with sulphuric acid. Shoddy, imperfect as it was, was found of value in rubber footwear, clothing, and chiefly in carriage cloth, in which it gave excellent service.

Nowadays, used rubber is reclaimed in large plants, under close technical supervision. The product obtained is plastic, and mixes readily with new rubber, sulphur, and other compounding ingredients. The raw material used governs to some extent the quality of the reclaimed rubber. Inner tubes consist of high grade rubber and no fiber is present. They yield the best quality of "reclaim", but all reclaimed rubber finds a use. It is not as good as pure new rubber if high tensile strength is required, but on the other hand a rubber compound need not consist entirely of new rubber if toughness and resistance to abrasion are demanded. In fact the type of mineral filler used is quite as important as the rubber. Therefore, in footwear and rubber heels, wire insulation, hose, and tires, the various types of reclaimed rubber serve a useful purpose and if used wisely, may not be considered an adulteration.

To be successful, the treatment of scrap rubber demands considerable investment in power plant, digesters, rubber mills and similar necessary equipment. The plant must have ample space for the storage of raw material and product, and must be located close to a sufficient and constant source of supply of used rubber. The transportation of waste speedily

eats up profits. In Akron, Ohio, it is not considered profitable to collect beyond a radius extending to Chicago. The price of crude rubber to some extent dictates demand and profits. However, modern reclaimed rubber, even during the period of low prices for crude in recent years, was in constant demand. For a short time its price even exceeded that of crude rubber.

The vigilance of the modern process begins with the sorting of the scrap. Although subject to a recognized classification by the dealer, the reclaimer sorts it again before processing. Sand and metals are removed as far as possible, and each assortment is finely ground and the ground waste passed over screens and magnetic separators.

From this point the removal of fiber is accomplished chiefly by the acid process of Mitchell or the alkali process of Marks. By far the largest amount of reclaimed rubber on the market is produced by the alkali process. In the acid process the ground scrap is treated with dilute sulphuric acid in lead-lined vats, at the bottom of which live steam is injected. The fiber is slowly weakened and destroyed. This requires as much as four hours or more. The rubber is washed from the disintegrated fiber, generally passing over riffles which remove sand and metal. After thorough washing, the mass is generally mixed with oils, tars, or other softeners, and conveyed to large digesters. Live steam is forced into the mixture for 24 to 48 hours at a pressure of 100 to 150 pounds. This treatment plasticizes the rubber and removes part of the free sulphur. The plasticized mixture is carefully dried, care being taken to avoid an elevated temperature.

When the alkali process is used the ground rubber admixed with fiber is treated in digesters with dilute caustic soda, the strength varying from two to eight per cent. The fiber is disintegrated and dissolved at 150 pounds steam pressure, in from 8 to 24 hours. A considerable amount of free sulphur is removed from the rubber. It is washed in tanks until practically free from alkali, sometimes run over riffles and finally dried at a low temperature. The dry rubber is softened by working on a rubber mill and then forced through heavy, cylindrical strainers. These are tubing machines fitted with fine perforated screens. The rubber emerges as strings, free from metal, grit and other impurities. The amount of metal removed at this late stage of the process is astonishing. The rubber is then passed between heavy rolls and appears as an extremely thin sheet leaving behind any coarse particles which may have escaped previous treatment. The rubber is converted to slabs, or cylinders about 4 inches in diameter, and placed in bags for shipment. The various grades of reclaimed rubber are very well reproduced in spite of variations in the scrap.

